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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/816,784	03/26/2001	Kazuhiro Hattori	010328	5542

23850 7590 04/08/2003

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EXAMINER	
VINH, LAN	
ART UNIT	PAPER NUMBER
1765	10

DATE MAILED: 04/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/816,784	Applicant(s) HATTORI, KAZUHIRO	
	Examiner Lan Vinh	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 March 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) *8* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. *09/816,784* .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group I, claims 1-7 in Paper No. 9 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al (US 5,770,098) in view of Kaneki et al (US 4,374,912)

Araki discloses a plasma/dry etching process comprises the steps of:

forming a layer 92 on a substrate, the layer 92 is subsequently etched (col 8, lines 1-3), which reads on preparing a layer to be etched

forming a resist pattern 93 on the layer 92 (col 8, line 1; fig. 8 of Araki shows that layer 93 covers/protects underlying layer 92 during etching), which reads on forming a mask on a layer to be etched

plasma/dry etching layer 92 (using layer 93 as a mask as shown in fig. 8) to form a contact hole using carbon monoxide gas with added nitrogen gas (col 8, lines 20-28),

which reads on dry etching the layer to be etched using a mask under a reaction gas of a carbon monoxide with an addictive of a nitrogen containing compound gas

Unlike the instant claimed inventions as per claims 1, 2, Araki does not specifically disclose forming a mask layer of tantalum on the layer to be etched.

However, Kaneki discloses a dry etching method comprises the step of forming a tantalum masking film by reactive sputtering using a tantalum (Ta) target (col 4, lines 9-20 , abstract)

Since both Araki and Kaneki are concerned with dry etching method using a mask, one skilled in the art would have found it obvious to modify Araki method by using a tantalum masking film during dry etching as per Kaneki because according to Kaneki tantalum is a high precision and high durability photomask thus there is little lowering of the dimensional precision even by overetching (col 2, lines 48-50, abstract)

The limitation of forming a resist pattern on the layer to be etched and sputtering a mask layer using a Ta target, as recited in claim 3. has been discussed above.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al (US 5,770,098) in view of Lee et al (US 5,422,312)

Araki discloses a plasma/dry etching process comprises the steps of:

forming a resist pattern 93 on the layer 92 (col 8, line 1; fig. 8 of Araki shows that layer 93 covers/protects underlying layer 92 during etching), which reads on forming a mask on a layer to be etched

plasma/dry etching layer 92 (using layer 93 as a mask as shown in fig. 8) to form a contact hole using carbon monoxide gas with added nitrogen gas (col 8, lines 20-28), which reads on dry etching the layer to be etched using a mask under a reaction gas of a carbon monoxide with an addictive of a nitrogen containing compound gas

Unlike the instant claimed inventions as per claim 4, Araki does not specifically disclose forming a mask layer of tantalum nitride on the layer to be etched.

However, Lee discloses a method of forming metal via by dry etching comprises the step of forming a mask layer of Tantalum nitride (TaN) by reactive sputtering in a nitrogen (N_2) environment (col 2, lines 55-58)

Since both Araki and Lee are concerned with dry etching method using a mask, one skilled in the art would have found it obvious to substitute Araki's resist mask layer with a TaN mask layer as per Lee because Lee teaches that by using the intermediate mask (TaN) instead of using photoresist as a mask, the layer to be etched will not suffer damages caused by photoresist related process such as solvent or plasma process when removing the photoresist (col 3, lines 31-36).

5. Claims 5, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al (US 5,770,098) in view of Lee et al (US 5,422,312) and further in view of Ding et al (US 6,200,433)

Araki as modified by Lee has been discussed above in paragraph 4. Unlike the instant claimed inventions as per claims 5, 7, Araki and Lee do not specifically disclose sputtering a mask layer (TaN) using a Ta/TaN target although Lee discloses forming a

mask layer of Tantalum nitride (TaN) by reactive sputtering in a nitrogen (N_2) environment.

However, Ding, in a method of depositing a barrier layer in a plasma chamber, discloses forming a barrier layer of TaN by sputtering using target of Ta, TaN (col 3, lines 28-30, col 7, lines 1-3)

Hence, one skilled in the art would have found it obvious to modify Araki and Lee by sputtering a mask layer (TaN) using a Ta/TaN target in view of Ding's teaching because Ding teaches that when a barrier layer (TaN) is deposited, the target preferably comprises Ta and TaN (col 3, lines 28-30)

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Araki et al (US 5,770,098) in view of Lee et al (US 5,422,312) and further in view of Tao et al (US 5,874,010)

Araki as modified by Lee has been discussed above in paragraph 4. Unlike the instant claimed inventions as per claim 6, Araki and Lee do not disclose sputtering a mask layer (TaN) using a mixture gas of Ar and nitrogen.

However, Tao, in a method of etching the pole material using ion beam etching/dry etching, discloses forming a TaN mask by reactive sputtering using Ar and nitrogen (col 4, lines 4-7)

Since Araki and Lee is directed to an etching method using a TaN mask layer, one skilled in the art would have found it obvious to modify Araki and Lee by forming a TaN mask using reactive sputtering in the presence of Ar and nitrogen as per Tao because

Tao teaches that in the case where mask layer is a nitride, it can be formed by reactive sputtering in the presence of Ar and Nitrogen (col 4, lines 1-7)

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.

LV
March 28, 2003